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ABSTRACT

This paper describes a study whose aim was to identify key factors and reasons why people choose secondary science teaching as a career. It also aimed to evaluate current United Kingdom marketing strategies for the teaching profession. Among the conclusions are that job satisfaction and working with children are the most important factors in the desire to be a science teacher, with sharing of knowledge and contributing to child development also important. (MM)

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Why Be a Science Teacher?

Susan Barker and Pilar Reyes
University of Warwick, Coventry, UK
s.barker@warwick.ac.uk

Key Words: recruitment, reasons for being a science teacher

INTRODUCTION

Teacher recruitment world-wide is currently a serious problem with science teachers particularly difficult to enlist. Whilst recruitment to the teaching profession does fluctuate on an annual basis and is linked directly with the job market, there has been a general trend downwards of numbers entering science teaching in recent years in the UK. This problem is likely to be exacerbated by the declining numbers of students taking up science at degree level and choosing science options in the school curriculum. Having motivated and enthusiastic science teachers who will engage youngsters in the discipline must be a priority in preparing our future citizens. During the 1990s recruitment for postgraduate teacher education courses in the UK in secondary teacher training, was on average 17% lower than the expected target with the subjects of maths and science facing serious recruitment problems. In 1998/99 there was severe under-recruitment in science (25% under) and although the 'under-target' figures are improving this is partly to do with the reduction in targets from 1997–2000. (DfEE and TTA 1999)

In order to address these difficulties the British government, since 1998 has provided financial incentives in terms of bursaries for students training in shortage subject areas (including Maths and Science) and from 2000 this money is in the form of training salaries for student teachers. From September 2000 the £70m package is being spent as a '*Golden hellos*', for those who enter teaching in Maths, Science, Modern Languages and Technology. It remains to be seen whether these Golden Hellos are sufficient to remedy the situation although early indications suggest that recruitment to teacher training course has in fact increased. The Graduate Teacher Training Registry (GTTR), a central agency which acts on behalf of universities, colleges of higher education and certain groups of schools in England and Wales process applications for entry to their pre-service Postgraduate Certificate in Education (PGCE) courses. Their data suggests that in December 2000:

- biology applications were up 18.8% ;
- chemistry applications were up 33.7% ;
- physics applications were slightly down. (GTTR 2001)

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They attribute such increases directly to the training salaries but also the significant marketing campaign using newspaper and television advertisements with the key slogan *'no one forgets a good teacher'*. However they do not account for the lack of any increase in physics applications.

Aim

The aim of this research is to identify key factors and reasons why people choose secondary science teaching as a career. It also aims to evaluate current UK marketing strategies for the teaching profession.

Objectives of the research

- identify the key reasons for being a secondary science school teacher;
- assess the reliability of reasons given on application forms for teacher training courses;
- evaluate current marketing strategies for teaching as a career;
- make recommendations for future science teacher recruitment.

Methodology

The data for this study were collected through content analysis of three sources of information plus an anonymous questionnaire, all from one Higher Education Institution. All student data were collected with permission from the students on the basis of agreed anonymity. The methods employed were:

- content analysis of GTTR (Graduate Teacher Training Registry) application forms for secondary science teaching (3 years n=100)
- anonymous questionnaire (2 years n=70);
- individual interviews (n=11);
- evaluation of Teacher Training Agency marketing materials.

1. GTTR FORMS

Permission was sought from trainees to analyse their GTTR application forms. Part of the form specifically requests information on why the applicant wants to teach. It was this section that was analysed using content analysis. It was carried out on 100 GTTR application forms from one Higher Education Institution for intake years of 1997/98, 1998/99, and 1999/00. Coding categories and units of analysis were identified through a preliminary review of the forms. The criteria used in selecting data for generating categories were the data itself. The data were selected in terms of what was significant to the research questions. Each reason given on the form was classified as "belonging or not belonging' to a particular group. During the process of developing categories, revisiting categories and data was crucial (see Dey 1993). The units of analysis were identified directly from the coding categories. Table 1 presents the reasons given grouped by the units of analysis.

Table 1: Units of Analysis for reasons for entering secondary science teaching recorded on GTTR forms.

Category	Unit of analysis
A	Subject
B	Personal qualities and skills
C	Professional concept of teaching
D	Intuitive feeling about teaching
E	Social interaction with people
F	Helping and sharing- altruism.

A coding frame was developed using these units and the reasons given by students on their GTTR were recorded in this frame.

2. Questionnaire. The questions/statements were framed after analysis of the reasons given on GTTR forms. They directly relate to the overall research questions and are as follows:

Table 2: Questionnaire Questions and Statements

I enjoy interacting with children.	I believe I have the right skills for teaching.
I wish to share my enthusiasm and knowledge.	
Teaching enables me to continue working in my subject area.	From a very early age I have always wanted to teach.
Teaching has a good career structure.	The teaching profession is rewarding career.
I believe I have a lot to offer by helping others to grow and learn.	There are not many jobs for graduate scientists but in teaching there are lots of jobs
I believe I would be a good teacher.	I enjoy working with young people.
I have the right personal qualities to be a teacher.	I cannot think of anything else to do
I enjoy my subject area very much	The holidays are good

The respondents were given the following instructions for completing the questionnaire:

The following is a set of statements about some views on going into teaching.

'For each statement please say whether is very important, important, neutral, not important, absolutely not important to you. Tick the appropriate box.'

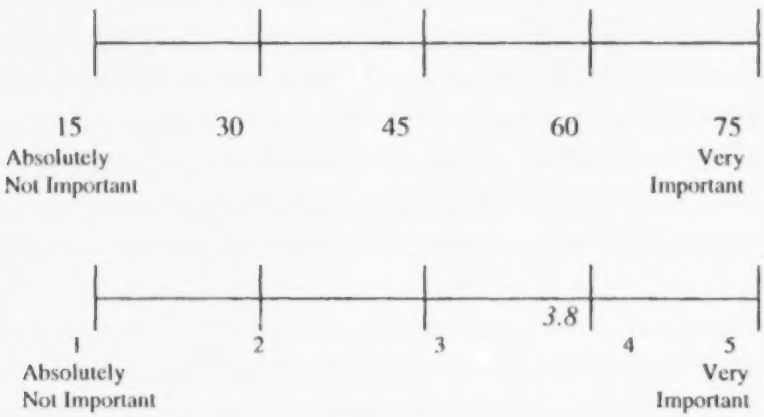
The boxes were arranged according a Likert type scale(Likert 1932) shown below:

Very Important	Important	Neutral	Not Important	Absolutely not important

The questionnaire was completed anonymously by students beginning their science teacher training course. After assigning numerical values (between 1–5) to the possible responses, a score for each individual was determined by calculating the sum of the numerical values of the alternatives checked. (Likert, 1932). The matrix was calculated using EXCEL Spreadsheet. Once the total score for each of student's answers was determined, the average was calculated with a very simple formula of the division of the total score of the students' answer by the total of lowest score of the statement given (15 points). Then the score is analysed within 1 to 5 points as follow:

For example, a student with a scores of 58 points in total, the sum is divided by 15 points and the result is 3.8 points. The student's reasons for going into teaching are highly relevant in his/her life.

Figure 1: Range of summated rates for Questionnaire about reason for going into teaching.



3. Interview. The interview questions directly relate to the overall aim of the research. All eleven interviews were recorded on tape and then transcribed. The interviewees all volunteered to be interviewed and were selected on that basis.

Table 3: Interview methodology and questions.

Sequence	Aims	Questions
Main body	To find out reasons why students want to enter the science teaching profession.	Why did you decide to come into the teaching profession to teach science?
Cool-off	To assess reliability of reasons given.	What would you say about the teaching profession to a friend who is not sure about going into teaching?

Results

1. GTTR forms The data from the forms are presented in Tables 4, 5 and 6 .

The majority of students indicated on their application forms that the main reason why they would like to be science teachers is that they want to continue working with their specialist subject (59%), that they have the personal attributes and skills for entering teaching (52%). and a love of children (53%).

Table 4: Reasons given on GTTR forms for entering secondary science teaching grouped by category.

Unit of analysis	% n=100	Summary	Examples
Subject	59	Teaching as a way of working with subject matter (Chemistry, Physics or Biology)	'my own passion for science provides my motivation to teach this diverse and complex subject matter'
Qualities and Skills	52	Teaching as related to variety of personal qualities and skills.	'I have good communication and presentation skills and I enjoy making presentations to students'
Concept of Education	22	Teaching as stimulating, challenging and rewarding profession.	'I believe it will offer me the challenge I want from a job'
Feeling about teaching	35	Teaching as a feeling of something to offer, helping in growing and learning.	'I have always wanted to teach'
Work with people	53	Teaching as interaction and love of children/young people.	'I love working with children'
Help and Share	40	Teaching as a contribution to child development.	'I would like to help children to enjoy the learning experience and give them confidence in themselves'

Table 5 : GTTR Reasons for entering science teaching by GENDER

	Female % (n= 59)	**Male** % (n=41)
Subject	64	51
Personal qualities and Skills	56	46
Professional concept of teaching	27	15
Intuitive feeling about teaching	32	39
Social interaction and love of children	56	49
Help and share	46	32

Table 6: GTTR reasons by subject and gender SUBJECT

Gender	**Female**			**Male**		
	Biol % n=39	**Chem % n=14**	**Phys % n=6**	Biol % n=25	Chem % n=9	Phys % n=7
Subject	**64**	**50**	**100**	60	11	71
Personal qualities and Skills	**64**	**29**	**66**	36	88	29
Concept of teaching	**26**	**36**	**17**	8	44	0
Intuitive feeling about teaching	**36**	**29**	**17**	52	22	14
Social interaction and love of children	**69**	**29**	**33**	56	33	43
Help and share	**51**	**29**	**50**	24	44	43

It seems that Physicists are most likely to give the subject reason than any other and Biology females are most likely to want to enter science teaching because of a love of chidden. Physics males are least likely to like children! Male chemists strongly indicate the skills aspects of teaching whereas female chemists and physicists are least likely to mention skills. Age aspects were analysed but the data not presented here because older students are fewer but observations form the data indicate that older females are more likely to want to teach as a result of a desire to work with children and a desire to help and share than anything else. There was also a similar general tendency with males but this was less pronounced; it seems the older you get, the more you wish to work with children.

3. QUESTIONNAIRE.

The overall range of the scale is from 15 to 75 with the high scores indicating those students having very important reasons to going into teaching and the low score few important reasons for going into teaching. The summated mean scores are presented in Table 7.

Table 7: Mean Summated Likert scores from questionnaires

Mean summated Likert scores	98/99	99/2000
Total	56.4	55.8
Female	56.5	56.2
Male	56.5	54.8
Biologists	57.1	55.7
Chemists	55.5	59.8
Physicists	55.8	50.7

Although statistical analysis is not yet complete it is clear that there is little difference in the importance of reasons for entering teaching with gender and subject. However the reasons given by female biologists are slightly more important to them than other categories of trainee teachers.

3. INTERVIEW

In individual interviews, other reasons which had not been eluded to through GTTR forms or questionnaire, were factors such as job security and geographical location and these were deemed important. When asked "*why did you decide to come into the teaching profession*?" The following reasons were given within the units of analysis being used in the research.

Table 8 :Example quotations from interviews grouped by units of analysis

Unit of Analysis	Example Quotations from interviews
Subject (100 % of respondents)	I enjoy and have a great interest in science. I have done it for so long. Ehhhm, for me really ,it was just ehm studying the subject area. I have always enjoyed passing on information. I always like the subject knowledge, you know working with, hopefully inspiring people, and they get more active in their education I suppose. When I was looking for a career change I still wanted to work with sciences , so I thought the enthusiasm that I have got I can bring it into a teaching
Qualities and Skills (45% of respondents)	I like talking.
Concept of Education (45% of respondents)	Ahm, I think it is a profession where you are giving and getting a lot of reward from it, I suppose
Feeling about teach ing (100% of respondents)	I have always wanted to teach Amh , I don't know it is something that I have always wanted to do.
Work with people (64% of respondents)	I have done quite a lot work with young people, and I generally love it, I like working with children, that is the main reason I want to do it.
Help and Share (64% of respondents)	I was doing my degree, I did a module in counselling in which I had to go into a local school and help for ten weeks, ten mornings sessions, and basically I went to school , observed the classes, and if people need any helped I tried. I have always liked sort of explaining thing to people

Other reasons which were given which did not fit into the coding categories or units were:

"I want to stay local hopefully because I have family now"

"Maybe its a silly reason probably to some people but I would like a job locally, and not to have to leave the family or anything, because I more family orientated ,so I could-n't imagine going into London to get a job or something"

"I have been looking for a job with stability and teaching does offers that"

These additional reasons were classified as job security and locality (geographical preference). In addition many students used the rewards from prior teaching experience as the stimulus to enter teaching profession e.g.

'I have done quite a lot work in school, I done more probably key stage 2 but sort of experience but then I went to key stage 3 and 4 so knew that was what I wanted to do I wanted to go to secondary'.

4. CURRENT MARKETING STRATEGIES

The advertising campaign is based on new slogan '*No one forgets a good teacher*'. Their brochure start with the following statement :

" Teaching is a challenging and rewarding profession. It demands the highest intellectual, analytical and communication skills. Teachers also need commitment, understanding and the imagination to inspire young minds. If you can meet this challenge, no other profession can give you the opportunity to make such a difference to so many young people's lives". (TTA 1999)

The booklet emphasises working with a specific subject area e.g. geography, skills and feeling of offering something to society. In addition job satisfaction and financial incentives are given great emphasis. The materials are not specific to science but the reasons given by the teachers appearing in the materials fit in well with the categories previously outlined. (Table 9)

Table 9: Content Analysis of teacher Training Materials- reasons given by cameo teachers

Unit of Analysis	Examples of teacher statements
Subject	"I entered to teaching profession because I have always enjoyed studying Geography and wanted a challenging career where I could use this Geography on daily basis"
Qualities and Skills	"To be a good teacher, you need a willingness to understand the student's position, effective organisation skills, and enthusiasm" "Excellent teachers will ensure that students have the opportunity to reach their full potential and fulfil their dreams" "It is important to have a sense of humour with pupils, interacting with them and gaining their respect. This is a career I am glad to have chosen" "New technology presents exciting new challenges to schools. Tools such as the internet and CD ROMs provide students with the opportunity to use resources and communicate with people from the whole world".

Concept of Education	"Education is constantly evolving; it is bound to have changed since you were at school yourself. There is a lot more to it than it seem as a pupil". "The majority of students recognise the importance of education, and I think society as a whole will re-assess, how it values teachers".
Feeling about teaching	"If you want a career that offers challenge, job satisfaction and opportunity- teaching is it".
Work with people	The interaction between teacher and student keeps you alert and alive. Every day is different and brings new challenges" "I became a teacher because I wanted to work with children, to open up ideas in their minds which lead to a desire for life-long learning".
Help and Share	There is immense satisfaction in knowing that you have helped pupils to achieve something whether it is an 18 year-old coping with A-level coursework or a year 7 pupil learning how to subtract two numbers without a calculator."

The teachers who feature as cameos can be described as follows:

Table 10 : Description of teachers features in 'No one forgets a good teacher' (TTA 1999)

	Approximate age			Ethnic Origin		
	Young under 25 years	Middle 25-35 years	Mature 35+ years	White	Black	Other
Male	7			5	2	
Female	9	1		9		1

The marketing materials as described in Table 10 are very much aimed at young newly qualified graduates. The new marketing materials for 2001 do not feature any cameos of teachers but relies heavily on abstract photographs. The booklet uses a slogan of *" Can you light a fire?" " Those who can, teach"*

DISCUSSION

The desire to be a science teacher is obviously based on a complex range of issues and determining the most important reasons and their determinant factors is difficult. The results obtained in this survey concur with other work in this field, with job satisfaction and working with children the most important factors and sharing of knowledge and contributing to child development also important (Stewart and Perrin (1989) and Reid and Cauldwell (1997). Stewart and Perrin (1989) and Reid and Cauldwell (1997)

also highlight being inspired by their own teachers as a common reason for entering teaching, Certainly in this study of science students inspiration was never mentioned as a reason. There is a mis-match of reasons when application forms and questionnaires are analysed. It is suggested that application forms for entering teacher training courses are not reliable in determining the real reasons for an individual pursuing science teaching as a career. Many applicants are clearly writing reasons in their course applications which they feel the selectors wish to hear. Indeed in anonymous questionnaire it seems that a small number of applicants are getting onto teacher training courses who are not truly dedicated to the profession having indicated that there was '*nothing else to do*'. Apart from wanting to work with the specialist science subject most of the reasons given for entering science teaching are generic and not specific to science. The marketing strategies employed by the Teacher Training Agency do include reasons which correlate closely with the reasons given by applicants, although job security and working in specific geographical locations are not used. Furthermore ' *having nothing else to do*' is also not employed despite it being a real reason given for entering teaching. The use of such statements could seriously damage the already low status that teachers have in the UK. The portrayal of young teachers of a mixed ethnic background is positive although could deter older candidates who have been shown by this research to demonstrate valid and important reasons for entering teaching.

It is recommended that in future, marketing and recruitment strategies should include the added value criteria identified in this research. In addition, further research is needed in order to ensure that individuals with excellent potential as science teachers do enter the profession and those who are least committed gain employment elsewhere. Increasing reliance is now being placed on training older people who enter from other occupations

(Spear, Gold and Lee 2000). Indeed this research would suggest that many of these older candidates wish to teach because of a genuine love of children and their subject-what more could we ask for!

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